

REMARKS/ARGUMENTS

Applicants respectfully request entry of this Amendment into the file of the subject case, in response to the Office Action, Made Final, mailed in the case on August 4, 2003.

Entry of the Amendment is deemed proper in that although amendments to certain of the claims are presented, the subject matter of such amendments is based on the original specification and drawing figures and does not add any new matter to the case; because the amended are deemed to more particularly recite and distinctly claim the subject matter which the applicants regard as the invention; and because entry of the Amendment reduces the number of issues on appeal should an appeal of the case be necessary. It is respectfully submitted that because all of the amended claims are based on and supported by the original specification, no new issues are introduced which would require further search by the Examiner.

In the Office Action, claims 1, 2 and 7 - 9 of the present application were rejected under 35 U.S.C. 102 (e) as being anticipated by U.S. Patent No. 6,424,153 to Liu et al ("Liu"). Specifically, the Examiner has stated, with respect to claims 1, 8, and 9, that Liu discloses a magnetic resonance imaging method comprising the steps of : generating magnetic resonance signals, applying temporary magnetic gradient fields (Liu at col. 2, lines 12-37), correcting the signal amplitudes of the magnetic resonance signals, or quantities calculated from the signal amplitudes (Liu at col. 5, lines 44-56), for deviations that are due to spatial non-linearities of the temporary magnetic gradient fields (Liu at Abstract; col. 1, lines 38-63; col. 5, lines 5-20); and applying an imaging pulse after said steps of generating magnetic resonance signals and applying magnetic gradient fields (Liu at Fig.2; col. 1, lines 66-67 and col. 2, lines 1-11).

With respect to claim 2 of the present application, the Examiner contends that Liu discloses that the correction of the signal amplitudes of the magnetic resonance signals is calculated from the spatial and temporary electric current distribution through a gradient coil (Liu at col. 1, lines 38-63).

With respect to claim 7 of the present application, the Examiner further contends that Liu discloses that the sequence of temporary gradient fields provides flow sensitivity and a flow quantity that is derived from the magnetic resonance signals, and that the flow quantity is corrected for deviations that are due to spatial non-linearities of the temporary magnetic gradient fields (Liu at Abstract; col. 1, lines 38-63 and col. 5, lines 5-20).

Applicants, by their attorney, respectfully disagree with the Examiner's contention that any or all of claims 1, 2, and 7-9 of the present application are anticipated by Liu. Applicants' position is based on the following counter arguments , which are based on a different interpretation of Liu.

In Liu, each MRI pulse sequence (100) is made up of from 16 - 64 imaging echoes (102) and a navigator echo (104). The navigator echo may be transmitted at any time, before, after, or in between transmission of the imaging echoes. Liu utilizes a controller (40) to control the gradient pulse amplifiers (20) and the transmitter (24) to produce a plurality of MRI pulse sequences that generate echoes received by the receiver (30) (Liu at col. 3., lines 36-39). The individual echoes (102) are separately phase encoded by varying the amplitude and/or duration of the phase encoding gradient pulses (142) (Liu at col. 4, lines 26-28). Phase encoding of the navigator echo is applied along a second direction orthogonal to the direction in which the individual echoes are encoded (Liu at col 4., lines 23-25).

The method and apparatus of the present invention utilize gradient coils to generate a temporary magnetic gradient field, which is applied equally to all of the magnetic resonance signals

being emitted, to spatially encode them, unlike the separate encoding of the imaging and navigator echoes in Liu.

Therefore, the entire magnetic resonance signal generation scheme, as well as the encoding process, of the present invention, are completely different from the method utilized in Liu, notwithstanding that certain elements of the apparatus may be termed the same and/or may seem superficially identical in their function. From the foregoing, it is apparent that while certain elements of the apparatus may be the same, they are used differently and the overall methods utilizing these elements are completely different.

It is submitted that the present amendments to the claims clarify the relationship among the various elements of the apparatus of the present invention, and the sequence of steps of the method of the present invention over the earlier versions of the claims.

Accordingly, it is respectfully submitted that none of the claims of the present application, including claims previously presented and amended hereby, are anticipated by Liu.

In the Office Action, claims 3-6 of the application were rejected under 35 U.S.C. 103(a) as being obvious over Liu in view of U.S. Patent No. 6,078,176 to McKinnon ("McKinnon").

With respect to claim 3 of the present application, the Examiner contends that while Liu discloses the invention of the present application except for the step wherein diffusion-weighted magnetic resonance signals are generated, McKinnon discloses the generation of diffusion-weighted magnetic resonance signals (McKinnon, Abstract), therefore it would have been obvious to a person of ordinary skill in the art at the time the present invention was made to use McKinnon's disclosure of diffusion-weighted magnetic resonance signals together with the magnetic resonance imaging method of Liu for the purpose of providing information depicting molecular displacements comparable to cell dimensions to obtain physiological information by a conventional imaging

modality, for making diagnoses of diseases in the brain, infarcts, and for characterizing brain tumors.

With regard to claim 4, the Examiner contends that Liu discloses that the sequence of temporary magnetic gradient fields includes a bipolar gradient pair, which the Examiner believes to be shown in Fig. 2 of Liu.

With regard to claim 5, the Examiner contends that Liu discloses that the sequence of temporary gradient fields includes a pair of gradient pulses that are separated by an RF focusing pulse, which the Examiner believes to be shown in Fig. 2 of Liu.

With respect to claim 6, the Examiner contends that Liu discloses the correction for deviations that are due to spatial non-linearities of the temporary magnetic gradient fields (Liu at Abstract; col. 1, lines 38-63; and col. 5, lines 5-20).

Although McKinnon discloses a method for producing a diffusion weighted MRI, a mode of operation which is also applicable to the apparatus and method of the present invention, even if diffusion-weighted MRI were practiced utilizing the method of Liu, the result would be completely different from the method and apparatus of the present invention as practiced in a diffusion-weighted MRI application, for the reasons set forth above that the fundamental method and apparatus of Liu is different from those of the present invention.

Accordingly, it is respectfully submitted that none of the claims of the present application, including claims previously presented and amended hereby, are rendered obvious by Liu in view of McKinnon.

Reconsideration and further examination of the present application in view of the Amendment and accompanying Remarks presented herein is respectfully requested. It is believed that after such reconsideration and further examination, the Examiner will find that the method and

apparatus of the present application, as recited according to amended claims 1-9 of the present application are not anticipated by Liu and/or are not obvious in view of Liu in combination of McKinnon; and that all of claims 1-9 of the present application patentably distinguish thereover, and are in-condition-for allowance, the early notification of which is earnestly solicited.

In the event that the Examiner continues to maintain that any or all of the claims are unpatentable, it is requested that the Examiner issue an Advisory Action specifically setting forth the continued reasons for rejection. The Examiner is respectfully requested to issue such an Advisory Action as soon as possible after receiving and considering this Amendment, so as to afford Applicants' attorney the time necessary to advise the Applicants and give them sufficient time to consider further action in the case, either filing an Appeal or a Request for Continuing Examination. In this regard, it would be helpful if the Examiner would be able to render some indication of patentability of the amended claims, were they to be examined under a RCE, if the Examiner has not allowed entry of those claims through this Amendment.

It is believed that no other fees or charges are required at this time in connection with the present application; however, if any other fees or charges are required at this time, they may be charged to our Patent and Trademark Office Deposit Account No. 03-2412.

Respectfully submitted,

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